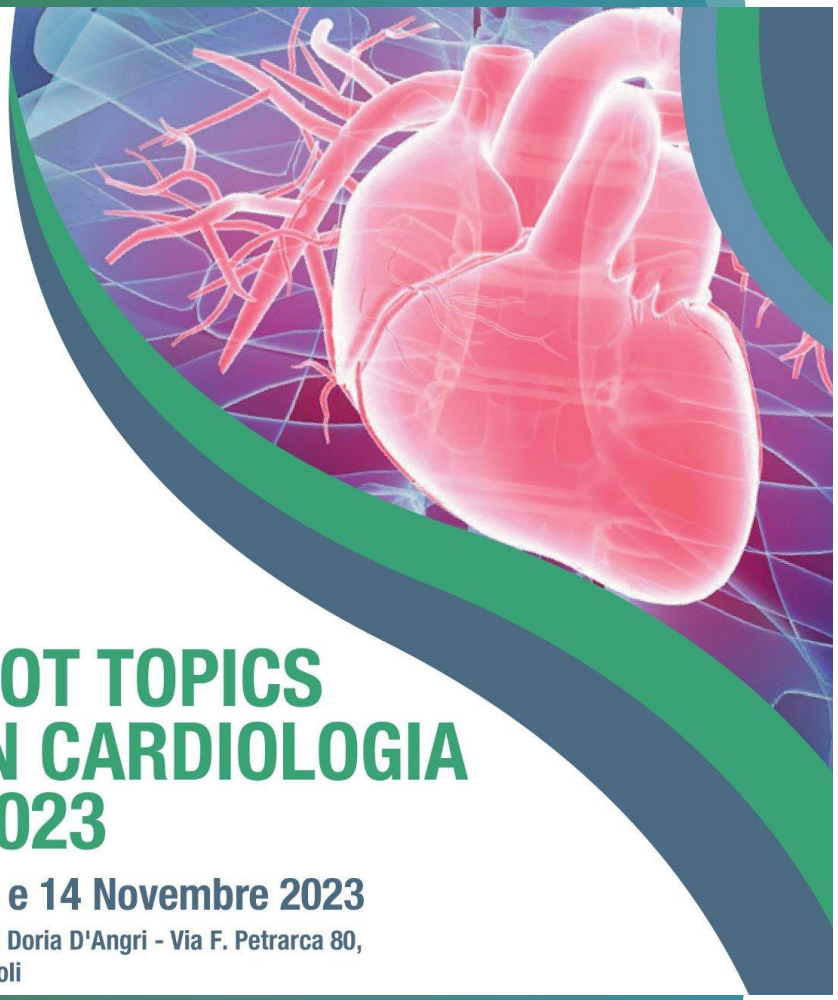


HOT TOPICS IN CARDIOLOGIA 2023

13 e 14 Novembre 2023

Villa Doria D'Angri - Via F. Petrarca 80,
Napoli

La scelta appropriata oltre la stimolazione convenzionale

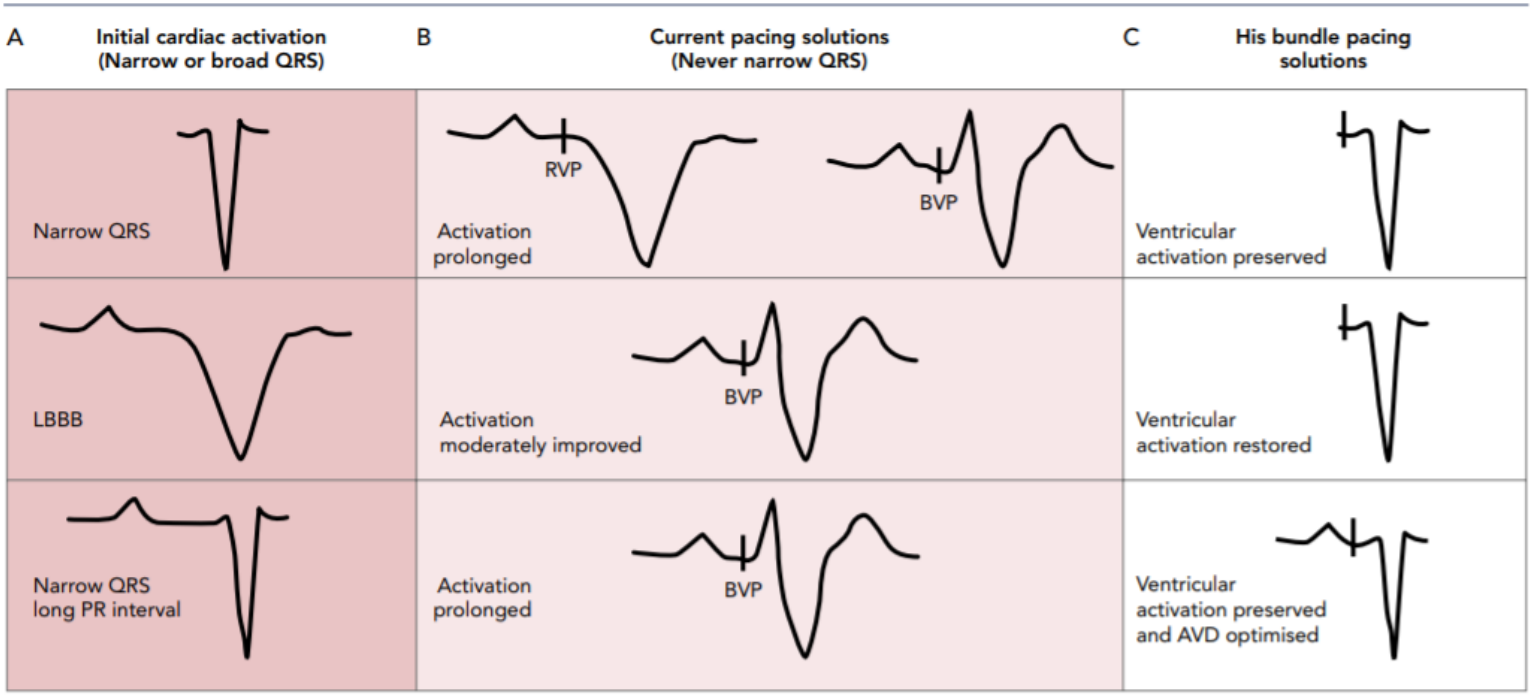
Mario Volpicelli
PO Santa Mario della Pieta' Nola

His Bundle Pacing: A New Frontier in the Treatment of Heart Failure

Nadine Ali, Daniel Keene, Ahran Arnold, Matthew Shun-Shin, Zachary I Whinnett and SM Afzal Sohaib

National Heart and Lung Institute, Imperial College London, UK

Figure 2: Potential of His Bundle Pacing



His bundle pacing across three classes of indications: (A) narrow QRS, (B) left bundle branch block (LBBB), and (C) long PR interval and narrow QRS. Right ventricular apical pacing (RVP) and biventricular pacing (BVP) do not completely restore narrow QRS. His bundle pacing fully maintains or restores narrow QRS and ventricular synchrony with atrioventricular delay optimisation.

ESC European Society of Cardiology
European Heart Journal (2021) 00, 1–94
doi:10.1093/eurheartj/ehab364

2021 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy

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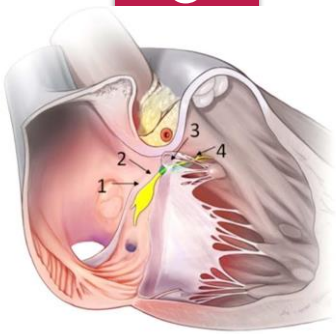

His Bundle Pacing is used in lieu of RV pacing, in lieu of biventricular pacing, and as His optimized CRT (HOT-CRT), which exploits a synergistic effect between HBP and RV pacing, LV pacing, or biventricular pacing to improve synchrony.
There is growing evidence, mainly from observational studies, that HBP may be safe and effective in these settings although large RCTs and long-term follow up are still lacking.

With more data on safety and effectiveness, **HBP is likely to play a growing role in pacing therapy in the future**

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Table 9 Advantages and disadvantages of a 'backup' ventricular lead with His bundle pacing

Advantages
• Increased safety (in case of loss of capture of the HBP lead)
• Can be used for sensing (lower risk of ventricular undersensing, no risk of His or atrial oversensing)
• Programming of pacing output with lower safety margins
• May serve to narrow the QRS with fusion pacing in the case of selective-HBP with uncorrected RBBB
Disadvantages
• Higher cost
• More transvenous hardware
• Risk associated with the additional lead (e.g. ventricular perforation)
• More complex programming
• "Off-label" use (current regulatory approval and MRI-conditionality for HBP is only granted for His leads connected to the RV port)

Recommendations for using His bundle pacing

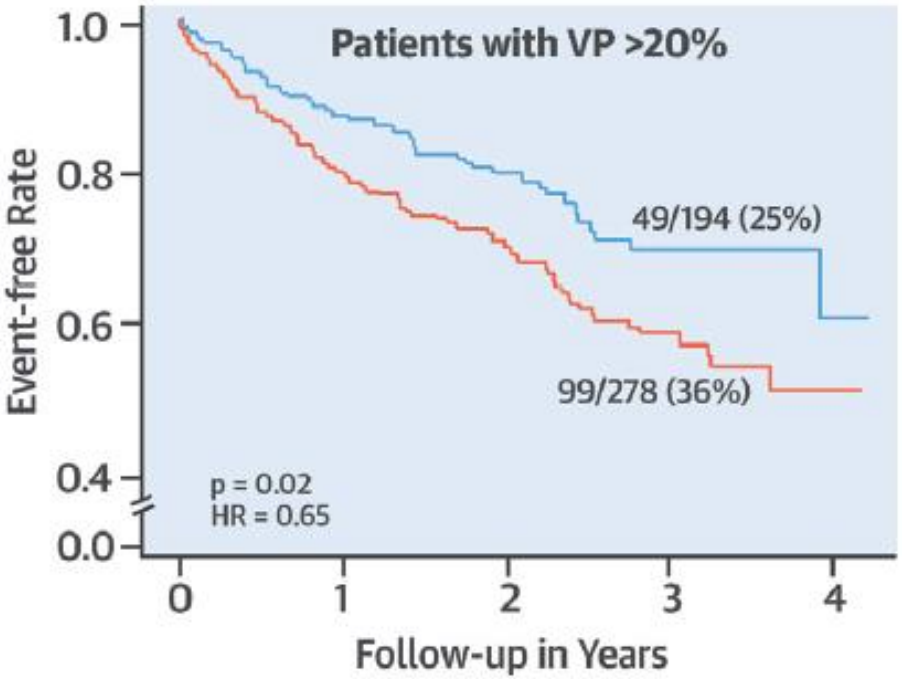
Recommendations	Class[a]	Level[b]
In patients treated with HBP, device programming tailored to specific requirements of HBP is recommended.[430,431]	I	C
In CRT candidates in whom coronary sinus lead implantation is unsuccessful, HBP should be considered as a treatment option along with other techniques such as surgical epicardial lead.[318,424,440,443]	IIa	B
In patients treated with HBP, implantation of an RV lead used as 'backup' for pacing should be considered in specific situations (e.g. pacemaker dependency, high-grade AVB, infranodal block, high pacing threshold, planned AVJ ablation) or for sensing in the case of issues with detection (e.g. risk of ventricular undersensing or oversensing of atrial/His potentials).[423,426,444]	IIa	C
HBP with a ventricular backup lead may be considered in patients in whom a 'pace-and-ablate' strategy for rapidly conducted supraventricular arrhythmia is indicated, particularly when the intrinsic QRS is narrow.[197,199,200,318]	IIb	C
HBP may be considered as an alternative to RV pacing in patients with AVB and LVEF >40%, who are anticipated to have >20% ventricular pacing.[42,433]	IIb	C

Clinical Outcomes of His Bundle Pacing Compared to Right Ventricular Pacing

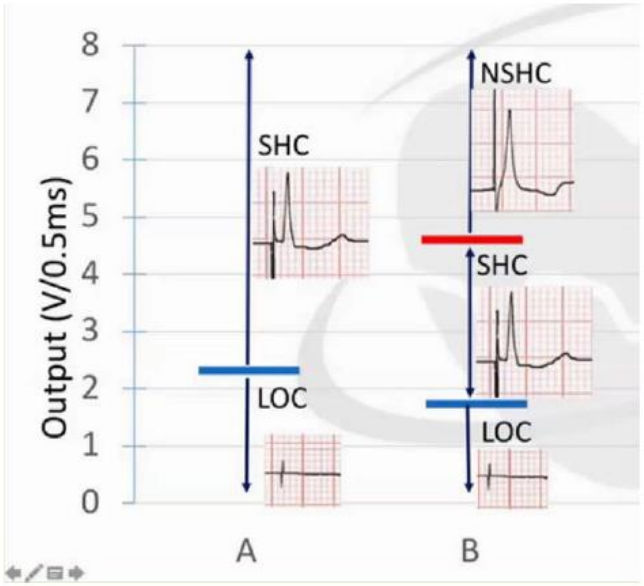
Abdelrahman et al. JACC 2018, 71:2319–30

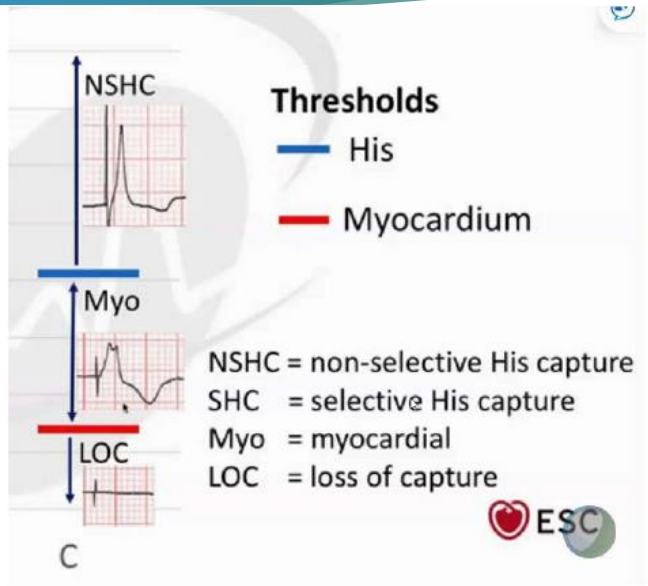
HBP 332 pts vs RVP 433 pts – Median Fup 2yrs

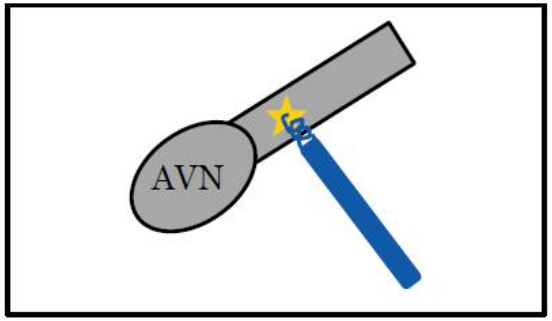
HBP was associated with significant reduction in the composite outcome of all-cause mortality, HFH, or upgrade to BiVP compared to conventional RVP. These differences in clinical out-comes were primarily realized in patients who required **>20% ventricular pacing**

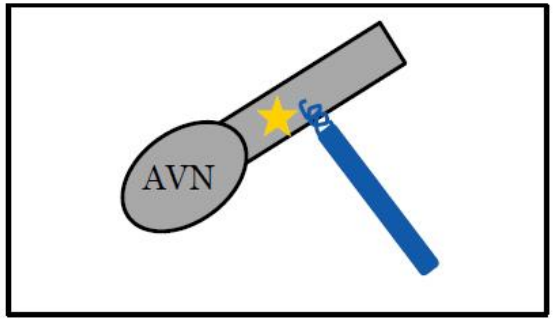


Differenti tipi di cattura hissiana









How to perform permanent His bundle pacing in routine clinical practice

Gopi Dandamudi, MD, FHRS,* Pugazhendhi Vijayaraman, MD, FHRS†

*From the *Indiana University School of Medicine, Indianapolis, Indiana, and †Geisinger Wyoming Valley Hospital, Wilkes-Barre, Pennsylvania.*

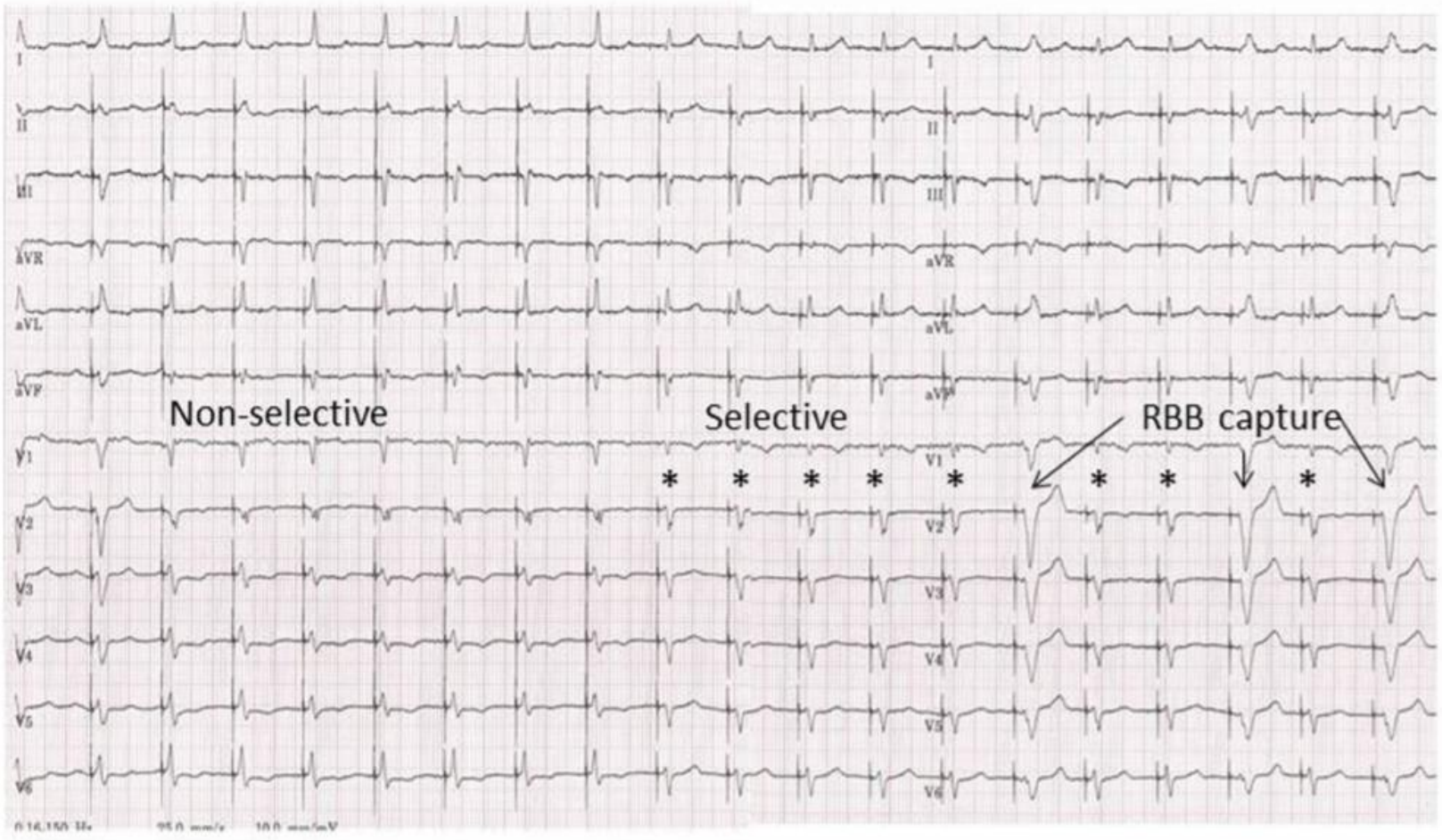


Figure 3 At higher output (up to 1.5 V @ 1 ms), there is fusion between His bundle and local myocardial capture (nonselective response). At lower outputs (up to 0.5 V @ 1 ms), there is pure His bundle capture with stimulus to QRS onset (S-QRS) equal to the native HV interval (selective response, *). Below this output, there is selective right bundle branch (RBB) capture.

HBP ha delle limitazioni:

- Difficoltà nell'identificare precisamente la posizione del fascio di His
- Una soglia di pacing più alta e instabile tra il 5% e il 10% dei pazienti
- Bassa ampiezza dell'onda R o ampio far field atriale che possono complicare la programmazione
- Danneggiamento del fascio di His durante l'impianto
- Blocco AV distale alla posizione del catetere
- Potenziali limitazioni nelle performance a lungo termine

Left Bundle Branch Pacing- Zhang – JACC 2019

Canadian Journal of Cardiology 33 (2017) 1736.e1–1736.e3 www.onlinecjc.ca

Case Report

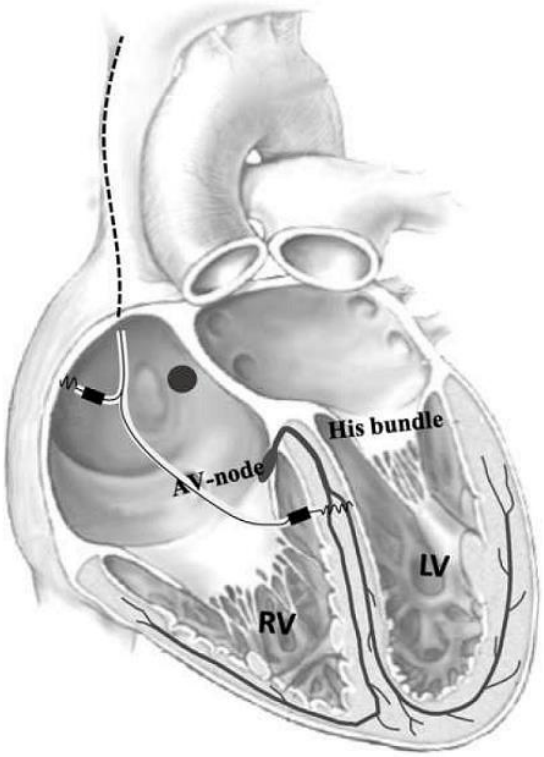
A Novel Pacing Strategy With Low and Stable Output: Pacing the Left Bundle Branch Immediately Beyond the Conduction Block

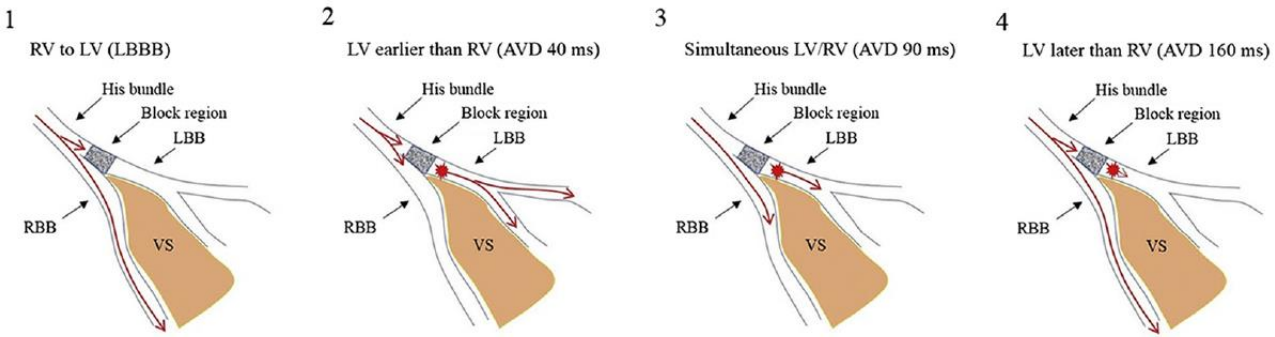
Weijian Huang, MD, FHRS,[a] Lan Su, MD,[a] Shengjie Wu, MD,[a] Lei Xu, MD,[a] Fangyi Xiao, MD,[a] Xiaohong Zhou, MD,[b] and Kenneth A. Ellenbogen, MD, FHRS[c]

[a] *Department of Cardiology, First Affiliated Hospital of Wenzhou Medical University, Key Lab of Cardiovascular Disease of Wenzhou, Wenzhou, China*

[b] *CRHF Division, Medtronic PLC, Mounds View, Minnesota, USA*

[c] *Department of Cardiology, Virginia Commonwealth University Health System, Richmond, Virginia, USA*





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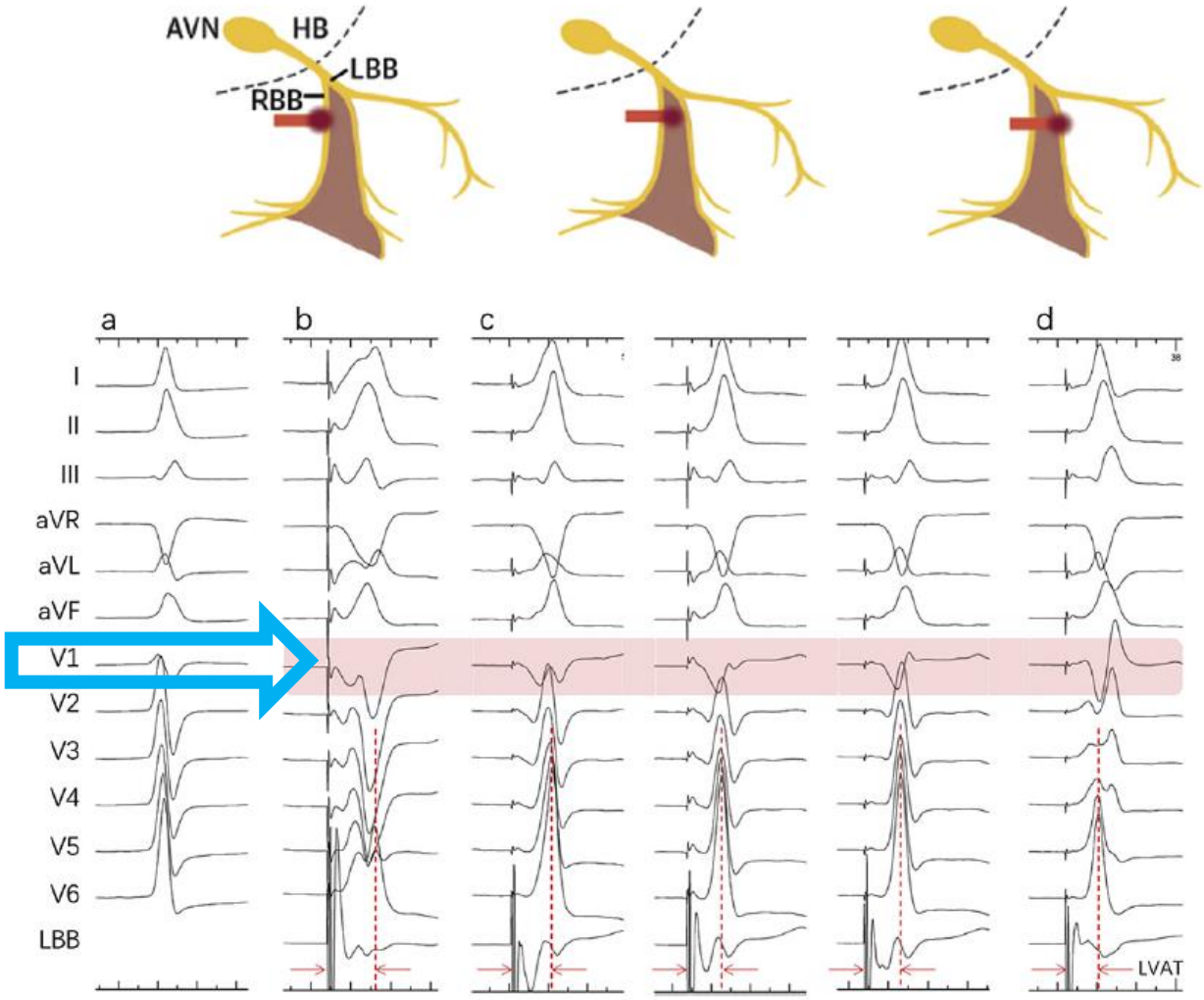
Le ultime linee guida trattano i benefici del LBBAP vs HBP

With **left bundle branch area pacing**, the lead is implanted slightly distal to the His bundle and is screwed deep in the LV septum, ideally to capture the left bundle branch.

Advantages of this technique are that **electrical parameters are usually excellent**, it may be **successful in blocks that are too distal** to be treated with HBP, and it also **facilitates AVJ ablation**, which may be challenging with HBP.

Tecnica d'impianto

Avanzando nel setto il QRS stimolato passa da una morfologia LBBB a una morfologia RBBB

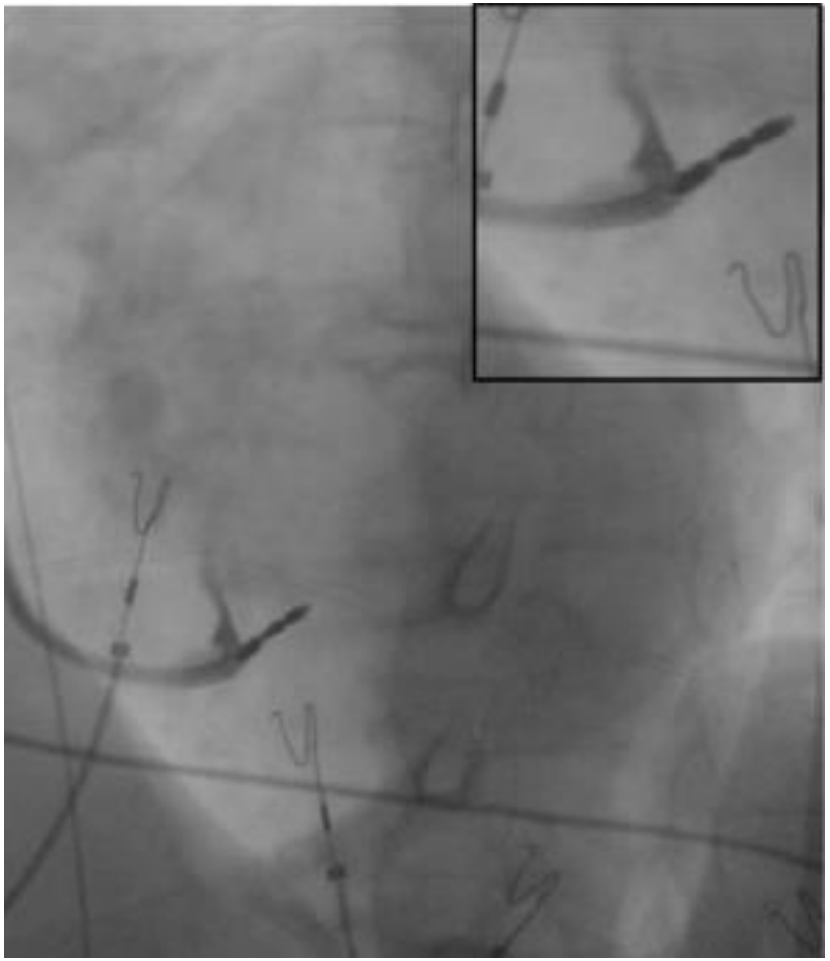


Left Bundle Branch Pacing- Zhang – JACC 2019

Tecnica d'impianto

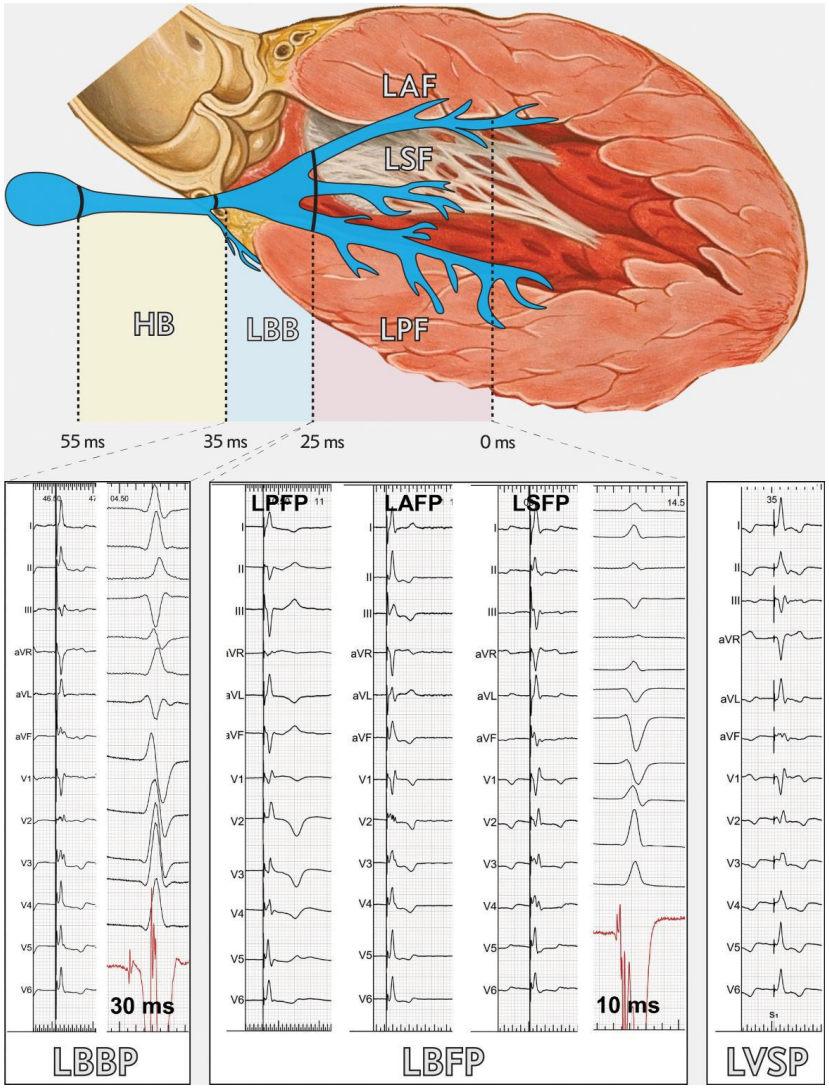
CONFERMA FLUOROSCOPICA

In LAO si può misurare di quanto l'elettrocatetere è avanzato all'interno del setto



Left bundle branch area pacing outcomes: the multicentre European MELOS study

Marek Jastrzębski [1]*, Grzegorz Kiełbasa [1], Oscar Cano [2,3], Karol Curila [4], Luuk Heckman [5], Jan De Pooter [6], Milan Chovanec [7], Leonard Rademakers [8], Wim Huybrechts [9], Domenico Grieco [10], Zachary I. Whinnett [11], Stefan A.J. Timmer [12], Arif Elvan [13], Petr Stros [4], Paweł Moskal [1], Haran Burri [14], Francesco Zanon [15], and Kevin Vernooy [4,16]

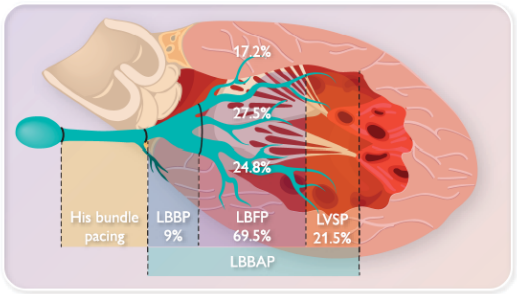


MELOS — MULTICENTER EUROPEAN LEFT BUNDLE BRANCH AREA PACING OUTCOMES STUDY

Prospective, multicenter, registry-based observational study

2533 Participants

14 European centres



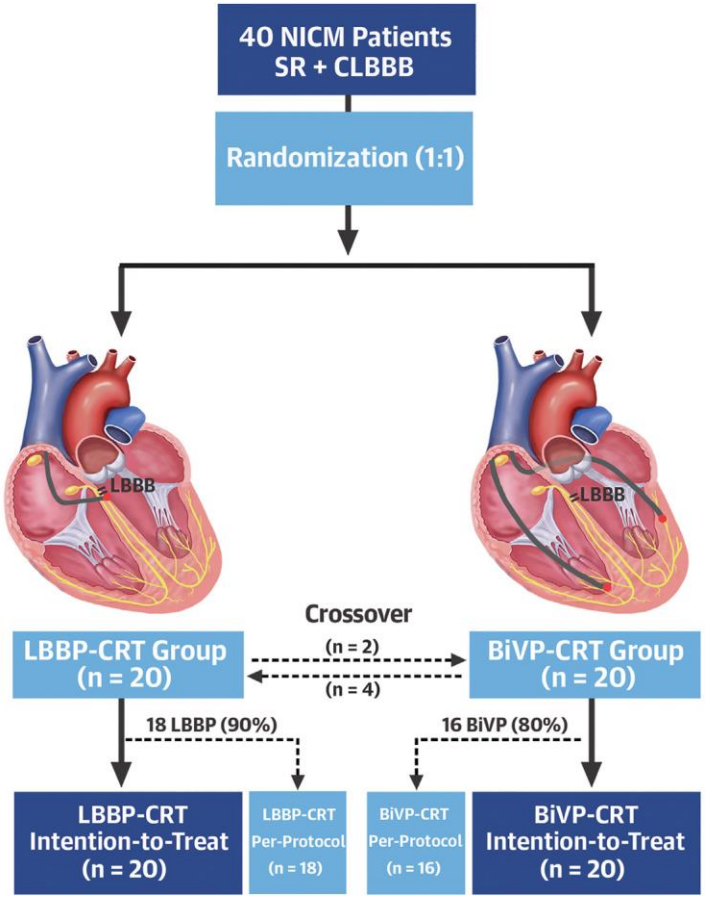
LBBAP implantation success	
Bradycardia indication success	92.4%
Heart failure indication success	82.2%

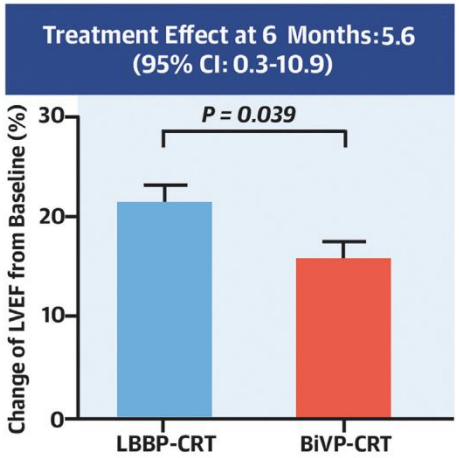
LBBAP lead complications	8.3%
• Acute perforation to LV	3.7%
• Lead dislodgement	1.5%
• Acute chest pain	1.0%
• Capture threshold rise	0.7%
• Acute coronary syndrome	0.4%
• Trapped/damaged helix	0.4%
• Delayed perforation to LV	0.1%
• Other	0.7%

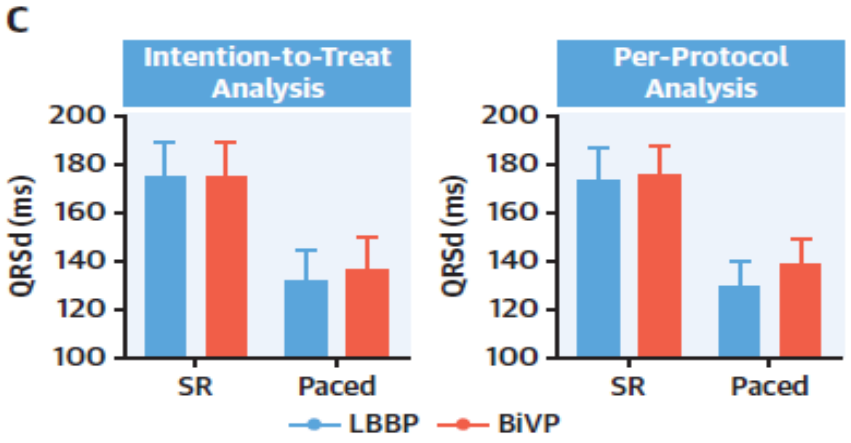
Independent predictors of LBBAP lead implantation failure

Heart failure indication	OR 1.49, 95% CI 1.01–2.21
Baseline QRS duration, per 10 ms	OR 1.08, 95% CI 1.03–1.14
LVEDD, per 10 mm increase	OR 1.53, 95% CI 1.26–1.86

Randomized Trial of Left Bundle Branch vs Biventricular Pacing for Cardiac Resynchronization Therapy



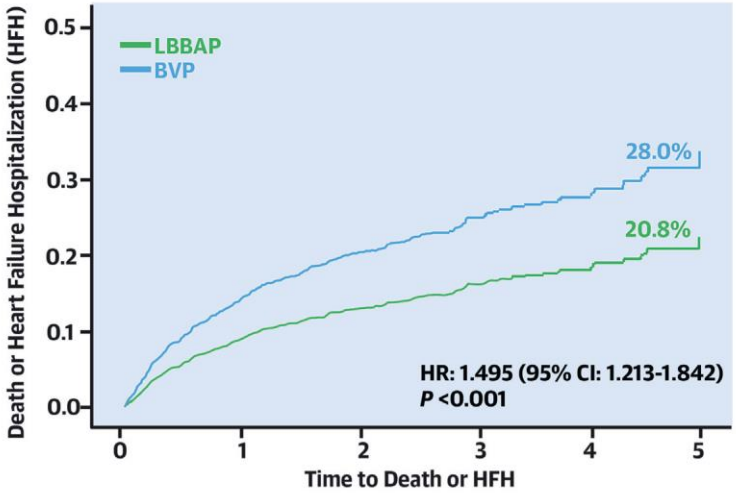




Wang Y, Zhu H, Hou X, Wang Z, Zou F, Qian Z, Wei Y, Wang X, Zhang L, Li X, Liu Z, Xue S, Qin C, Zeng J, Li H, Wu H, Ma H, Ellenbogen KA, Gold MR, Fan X, Zou J; LBBP-RESYNC Investigators. Randomized Trial of Left Bundle Branch vs Biventricular Pacing for Cardiac Resynchronization Therapy. J Am Coll Cardiol. 2022 Sep 27;80(13):1205-1216. doi: 10.1016/j.jacc.2022.07.019. PMID: 36137670.

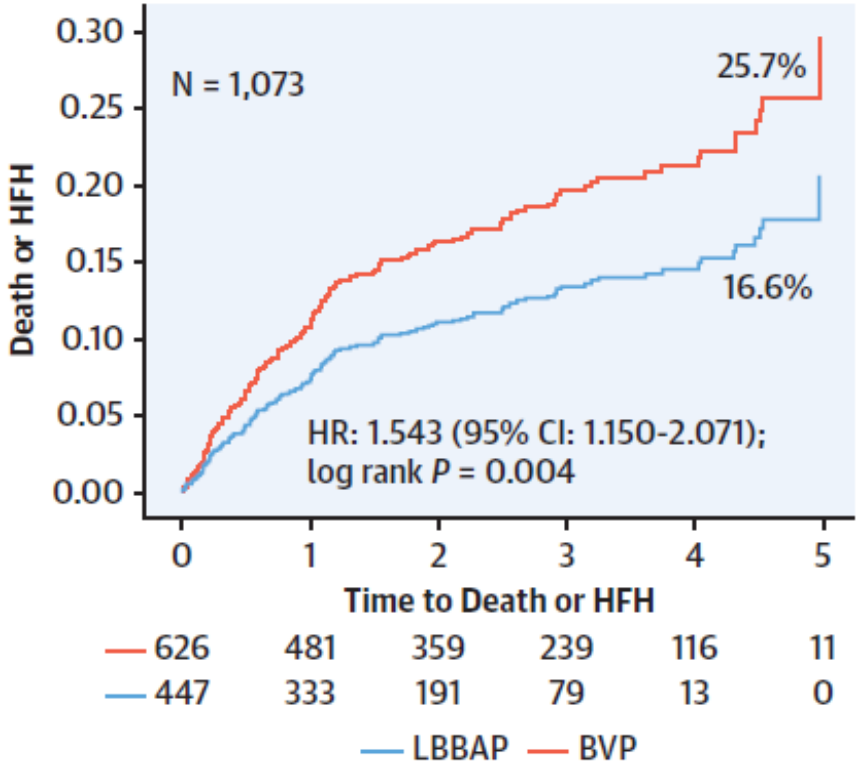
Comparison of Left Bundle Branch Area Pacing and Biventricular Pacing in Candidates for Resynchronization Therapy

Time to Death or Heart Failure Hospitalization
All Patients (n = 1,778)



BVP	981	728	546	352	166	18
LBBAP	797	574	342	152	18	0

Time to Death or HFH in LBBB



Vijayaraman P, Sharma PS, Cano Ó, Ponnusamy SS, Herweg B, Zanon F, Jastrzebski M, Zou J, Chelu MG, Vernooy K, Whinnett ZI, Nair GM, Molina-Lerma M, Curila K, Zalavadia D, Haseeb A, Dye C, Vipparthy SC, Brunetti R, Moskal P, Ross A, van Stipdonk A, George J, Qadeer YK, Mumtaz M, Kolominsky J, Zahra SA, Golian M, Marcantoni L, Subzposh FA, Ellenbogen KA. Comparison of Left Bundle Branch Area Pacing and Biventricular Pacing in Candidates for Resynchronization Therapy. J Am Coll Cardiol. 2023 Jul 18;82(3):228-241. doi: 10.1016/j.jacc.2023.05.006. Epub 2023 May 21. PMID: 37220862.

Santa Maria della Pietà Registry

- Da Ottobre 2022 a Settembre 2023, 106 pazienti (età media 73.1±9.5 anni, 70% uomini) trattati con CSP per le seguenti indicazioni: 50% CRT, 29% blocco AV, 9% brady FA, and 4% ablazione del nodo.
- CPS con successo in 104/106 pazienti (98% rate di successo).
- Sei complicanze (5.7%): 3 dislocazioni del catetere CSP, (2 in acuto e 1 a un mese dall'impianto) 1 dislocazione del catetere atriale, 1 danneggiamento della vite dell'elettrocatere, e 1 perforazione in ventricolo sinistro senza conseguenze.